

PETROLEUM DEVELOPMENT CORP Weld County CO

Well Name: **Thornton 21R-403**

Surface Location: Thornton 21R-HZ Pad Sec.21-T7N-R66W

North American Datum 1983 , US State Plane 1983 , Colorado Northern Zone

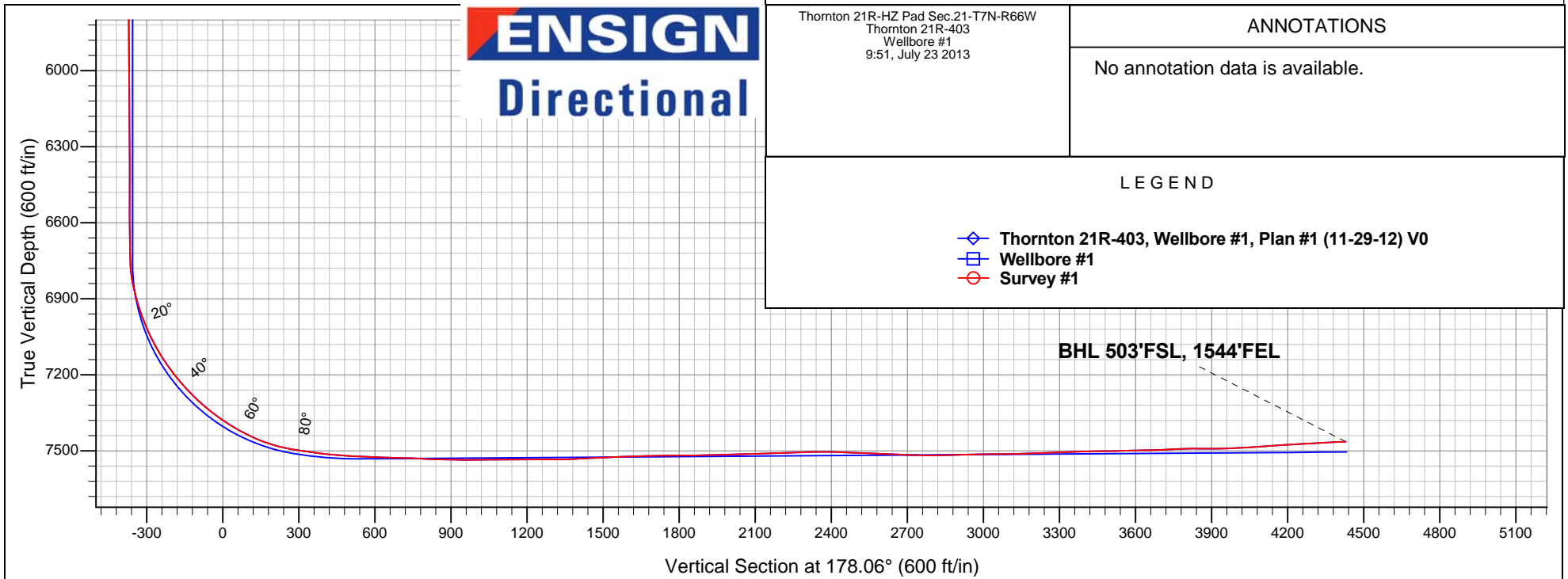
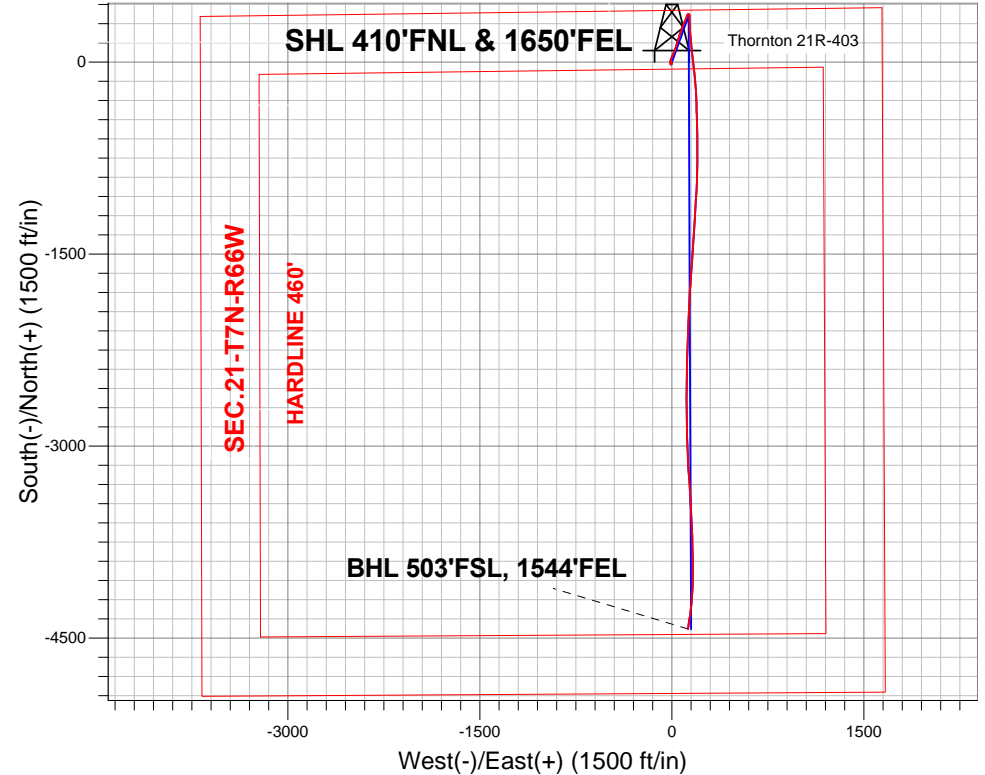
Ground Elevation: 4970.0

+N/-S	+E/-W	Northing	Easting	Latitude	Longitude	Slot
0.0	0.0	1450103.20	3200184.96	40.566700	-104.779450	

RKB - 15' WELL @ 4985.0ft (RKB - 15')

FINAL SURVEY

Projected Bottom Hole Location
11997'MD 7464'TVD 4428'S &
126'E of SHL 92.90 degree Incl @
188.30 degree AZM





Directional

PETROLEUM DEVELOPMENT CORP Weld County CO

SEC.21-T7N-R66W

Thornton 21R-HZ Pad Sec.21-T7N-R66W

Thornton 21R-403

Wellbore #1

Survey: Survey #1

Standard Survey Report

23 July, 2013

Company:	PETROLEUM DEVELOPMENT CORP Weld County CO	Local Co-ordinate Reference:	Well Thornton 21R-403
Project:	SEC.21-T7N-R66W	TVD Reference:	WELL @ 4985.0ft (RKB - 15')
Site:	Thornton 21R-HZ Pad Sec.21-T7N-R66W	MD Reference:	WELL @ 4985.0ft (RKB - 15')
Well:	Thornton 21R-403	North Reference:	True
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	Landmark

Project	SEC.21-T7N-R66W, Weld County, Colorado		
Map System:	US State Plane 1983	System Datum:	Mean Sea Level
Geo Datum:	North American Datum 1983		Using Well Reference Point
Map Zone:	Colorado Northern Zone		Using geodetic scale factor

Site		Thornton 21R-HZ Pad Sec.21-T7N-R66W			
Site Position:		Northing:	1,450,103.21 ft	Latitude:	40.566700
From:	Lat/Long	Easting:	3,200,184.96 ft	Longitude:	-104.779450
Position Uncertainty:	0.0 ft	Slot Radius:	"	Grid Convergence:	0.47 °

Well	Thornton 21R-403					
Well Position	+N/-S	0.0 ft	Northing:	1,450,103.20 ft	Latitude:	40.566700
	+E/-W	0.0 ft	Easting:	3,200,184.96 ft	Longitude:	-104.779450
Position Uncertainty		0.0 ft	Wellhead Elevation:	ft	Ground Level:	4,970.0 ft

Wellbore	Wellbore #1				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2010	7/8/2013	8.61	67.11	52,998

Design	Wellbore #1				
Audit Notes:					
Version:	1.0	Phase:	ACTUAL	Tie On Depth:	0.0
Vertical Section:	Depth From (TVD) (ft)	+N/-S (ft)	+E/-W (ft)	Direction (°)	
	0.0	0.0	0.0	178.06	

Survey Program	Date 7/23/2013			
From (ft)	To (ft)	Survey (Wellbore)	Tool Name	Description
144.0	11,997.0	Survey #1 (Wellbore #1)	MWD	MWD - Standard

Survey									
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)
0.0	0.00	0.00	0.0	0.0	0.0	0.0	0.00	0.00	0.00
144.0	1.50	169.70	144.0	-1.9	0.3	1.9	1.04	1.04	0.00
234.0	1.80	187.80	233.9	-4.4	0.4	4.4	0.66	0.33	20.11
325.0	1.10	175.20	324.9	-6.7	0.2	6.7	0.84	-0.77	-13.85
417.0	1.80	185.60	416.9	-9.0	0.2	9.0	0.81	0.76	11.30
508.0	1.00	203.30	507.9	-11.2	-0.3	11.2	0.99	-0.88	19.45
600.0	1.00	201.30	599.8	-12.7	-0.9	12.6	0.04	0.00	-2.17
690.0	0.70	226.20	689.8	-13.8	-1.6	13.7	0.52	-0.33	27.67
781.0	1.20	243.40	780.8	-14.6	-2.8	14.5	0.63	0.55	18.90
872.0	1.50	241.00	871.8	-15.6	-4.7	15.4	0.34	0.33	-2.64
942.0	1.50	241.00	941.8	-16.5	-6.3	16.2	0.00	0.00	0.00
1,035.0	1.50	260.90	1,034.7	-17.3	-8.6	17.0	0.56	0.00	21.40

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Site:	Thornton 21R-HZ Pad Sec.21-T7N-R66W	MD Reference:	WELL @ 4985.0ft (RKB - 15')
Well:	Thornton 21R-403	North Reference:	True
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	Landmark

Survey									
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)
1,126.0	1.10	2.40	1,125.7	-16.6	-9.7	16.2	2.23	-0.44	111.54
1,222.0	1.20	349.00	1,221.7	-14.7	-9.9	14.3	0.30	0.10	-13.96
1,318.0	1.00	350.50	1,317.7	-12.8	-10.2	12.5	0.21	-0.21	1.56
1,413.0	1.30	344.20	1,412.7	-11.0	-10.6	10.6	0.34	0.32	-6.63
1,508.0	1.10	340.60	1,507.7	-9.1	-11.2	8.7	0.22	-0.21	-3.79
1,604.0	1.20	345.00	1,603.6	-7.3	-11.8	6.9	0.14	0.10	4.58
1,699.0	1.10	343.90	1,698.6	-5.4	-12.3	5.0	0.11	-0.11	-1.16
1,794.0	1.20	350.10	1,793.6	-3.6	-12.7	3.1	0.17	0.11	6.53
1,889.0	1.20	341.80	1,888.6	-1.6	-13.2	1.2	0.18	0.00	-8.74
1,985.0	2.10	7.40	1,984.5	1.1	-13.3	-1.5	1.19	0.94	26.67
2,080.0	3.60	12.29	2,079.4	5.7	-12.5	-6.1	1.60	1.58	5.15
2,175.0	4.40	13.30	2,174.2	12.2	-11.0	-12.5	0.85	0.84	1.06
2,271.0	4.90	16.60	2,269.9	19.7	-9.0	-20.0	0.59	0.52	3.44
2,366.0	5.60	20.90	2,364.5	27.9	-6.1	-28.1	0.84	0.74	4.53
2,461.0	6.30	26.80	2,459.0	36.9	-2.1	-36.9	0.98	0.74	6.21
2,556.0	6.50	29.30	2,553.4	46.2	2.8	-46.1	0.36	0.21	2.63
2,651.0	7.30	24.10	2,647.7	56.4	7.9	-56.1	1.07	0.84	-5.47
2,746.0	8.00	22.70	2,741.8	68.0	12.9	-67.5	0.76	0.74	-1.47
2,842.0	7.50	22.90	2,837.0	80.0	18.0	-79.3	0.52	-0.52	0.21
2,937.0	7.10	20.40	2,931.2	91.2	22.4	-90.4	0.54	-0.42	-2.63
3,032.0	8.20	17.60	3,025.3	103.1	26.5	-102.2	1.22	1.16	-2.95
3,127.0	7.40	15.00	3,119.5	115.5	30.2	-114.4	0.92	-0.84	-2.74
3,223.0	7.80	18.50	3,214.6	127.7	33.8	-126.4	0.64	0.42	3.65
3,318.0	6.70	16.40	3,308.9	139.1	37.4	-137.7	1.19	-1.16	-2.21
3,414.0	7.20	18.40	3,404.1	150.2	40.9	-148.7	0.58	0.52	2.08
3,509.0	6.70	21.00	3,498.4	161.0	44.8	-159.4	0.62	-0.53	2.74
3,605.0	7.00	14.20	3,593.8	171.9	48.2	-170.2	0.90	0.31	-7.08
3,700.0	7.20	12.10	3,688.0	183.3	50.9	-181.5	0.34	0.21	-2.21
3,795.0	7.20	15.30	3,782.3	194.9	53.7	-193.0	0.42	0.00	3.37
3,891.0	6.90	22.70	3,877.6	206.0	57.5	-203.9	1.00	-0.31	7.71
3,986.0	8.40	21.20	3,971.7	217.7	62.2	-215.5	1.59	1.58	-1.58
4,081.0	8.30	23.70	4,065.7	230.5	67.5	-228.1	0.40	-0.11	2.63
4,176.0	8.70	19.10	4,159.7	243.6	72.6	-241.0	0.83	0.42	-4.84
4,271.0	8.70	18.10	4,253.6	257.2	77.2	-254.4	0.16	0.00	-1.05
4,366.0	8.30	19.30	4,347.5	270.5	81.7	-267.6	0.46	-0.42	1.26
4,462.0	7.00	17.60	4,442.7	282.6	85.7	-279.5	1.37	-1.35	-1.77
4,557.0	7.60	23.40	4,536.9	293.9	90.0	-290.7	1.00	0.63	6.11
4,652.0	6.80	23.10	4,631.2	304.8	94.7	-301.4	0.84	-0.84	-0.32
4,748.0	7.30	27.80	4,726.4	315.4	99.8	-311.9	0.79	0.52	4.90
4,842.0	6.70	23.40	4,819.7	325.8	104.7	-322.0	0.86	-0.64	-4.68
4,937.0	5.40	23.80	4,914.2	334.9	108.7	-331.1	1.37	-1.37	0.42
5,032.0	4.90	20.40	5,008.8	342.8	111.9	-338.8	0.62	-0.53	-3.58
5,127.0	4.60	15.20	5,103.5	350.3	114.4	-346.2	0.55	-0.32	-5.47
5,222.0	4.30	13.70	5,198.2	357.4	116.2	-353.3	0.34	-0.32	-1.58
5,317.0	3.00	23.30	5,293.0	363.2	118.0	-359.0	1.51	-1.37	10.11
5,412.0	2.60	26.50	5,387.9	367.4	120.0	-363.1	0.45	-0.42	3.37
5,506.0	2.20	23.70	5,481.8	371.0	121.7	-366.6	0.44	-0.43	-2.98
5,602.0	2.20	73.40	5,577.7	373.2	124.2	-368.7	1.93	0.00	51.77
5,697.0	1.70	52.80	5,672.7	374.5	127.0	-370.0	0.90	-0.53	-21.68
5,792.0	0.50	97.10	5,767.7	375.3	128.6	-370.8	1.46	-1.26	46.63
5,887.0	0.90	123.30	5,862.7	374.9	129.6	-370.3	0.53	0.42	27.58
5,982.0	1.00	113.80	5,957.7	374.1	131.0	-369.5	0.20	0.11	-10.00
6,078.0	0.80	114.90	6,053.6	373.5	132.4	-368.8	0.21	-0.21	1.15

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Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
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Survey									
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6,173.0	0.70	128.10	6,148.6	372.9	133.4	-368.1	0.21	-0.11	13.89
6,268.0	0.60	106.30	6,243.6	372.4	134.3	-367.6	0.28	-0.11	-22.95
6,363.0	0.30	98.60	6,338.6	372.2	135.1	-367.4	0.32	-0.32	-8.11
6,458.0	0.50	133.20	6,433.6	371.9	135.6	-367.1	0.32	0.21	36.42
6,553.0	0.20	189.80	6,528.6	371.4	135.9	-366.6	0.45	-0.32	59.58
6,648.0	0.30	133.00	6,623.6	371.1	136.0	-366.3	0.27	0.11	-59.79
6,713.0	0.20	74.40	6,688.6	371.0	136.3	-366.2	0.40	-0.15	-90.15
6,744.0	0.30	180.30	6,719.6	370.9	136.3	-366.1	1.30	0.32	341.61
6,776.0	2.50	174.10	6,751.6	370.2	136.4	-365.3	6.88	6.88	-19.38
6,808.0	5.80	176.50	6,783.5	367.9	136.6	-363.0	10.32	10.31	7.50
6,839.0	8.80	176.40	6,814.3	363.9	136.8	-359.1	9.68	9.68	-0.32
6,871.0	11.60	175.90	6,845.8	358.3	137.2	-353.4	8.75	8.75	-1.56
6,903.0	13.80	175.80	6,877.0	351.3	137.7	-346.4	6.88	6.88	-0.31
6,935.0	15.90	176.80	6,907.9	343.1	138.2	-338.2	6.61	6.56	3.13
6,967.0	17.90	177.80	6,938.5	333.8	138.7	-328.9	6.32	6.25	3.13
6,998.0	20.20	178.00	6,967.8	323.7	139.0	-318.8	7.42	7.42	0.65
7,029.0	22.20	179.20	6,996.7	312.5	139.3	-307.6	6.60	6.45	3.87
7,061.0	24.00	180.00	7,026.2	299.9	139.4	-295.0	5.71	5.63	2.50
7,093.0	25.90	179.80	7,055.2	286.4	139.4	-281.5	5.94	5.94	-0.63
7,125.0	28.20	178.50	7,083.7	271.9	139.6	-267.0	7.42	7.19	-4.06
7,156.0	30.80	176.50	7,110.6	256.6	140.3	-251.7	8.97	8.39	-6.45
7,188.0	33.20	175.10	7,137.8	239.7	141.6	-234.8	7.85	7.50	-4.38
7,220.0	35.40	174.60	7,164.2	221.8	143.2	-216.8	6.93	6.88	-1.56
7,252.0	37.30	175.20	7,190.0	202.9	144.9	-197.8	6.04	5.94	1.88
7,284.0	39.00	175.10	7,215.1	183.2	146.5	-178.1	5.32	5.31	-0.31
7,315.0	41.60	176.00	7,238.8	163.2	148.1	-158.1	8.59	8.39	2.90
7,346.0	43.40	174.90	7,261.6	142.3	149.8	-137.2	6.28	5.81	-3.55
7,378.0	45.60	175.10	7,284.5	120.0	151.7	-114.8	6.89	6.88	0.63
7,410.0	47.40	173.70	7,306.5	96.9	154.0	-91.6	6.46	5.63	-4.38
7,442.0	49.60	171.30	7,327.7	73.1	157.1	-67.7	8.88	6.88	-7.50
7,473.0	52.10	172.10	7,347.3	49.3	160.6	-43.9	8.31	8.06	2.58
7,505.0	54.50	173.50	7,366.4	23.9	163.8	-18.3	8.28	7.50	4.38
7,537.0	56.30	173.00	7,384.6	-2.3	166.9	7.9	5.77	5.63	-1.56
7,568.0	58.50	172.80	7,401.3	-28.2	170.1	33.9	7.12	7.10	-0.65
7,600.0	60.90	173.70	7,417.4	-55.6	173.4	61.5	7.88	7.50	2.81
7,632.0	63.30	174.00	7,432.4	-83.8	176.4	89.7	7.55	7.50	0.94
7,663.0	65.20	174.50	7,445.8	-111.5	179.2	117.5	6.30	6.13	1.61
7,695.0	68.00	175.60	7,458.6	-140.8	181.7	146.9	9.30	8.75	3.44
7,727.0	71.20	176.00	7,469.7	-170.7	183.9	176.8	10.07	10.00	1.25
7,759.0	74.20	176.80	7,479.2	-201.2	185.8	207.4	9.67	9.38	2.50
7,790.0	77.10	177.60	7,486.9	-231.2	187.3	237.4	9.68	9.35	2.58
7,821.0	79.60	177.80	7,493.2	-261.5	188.5	267.7	8.09	8.06	0.65
7,853.0	81.50	178.20	7,498.4	-293.1	189.6	299.3	6.06	5.94	1.25
7,931.0	82.80	176.90	7,509.1	-370.3	192.9	376.6	2.35	1.67	-1.67
7,961.0	83.40	177.30	7,512.7	-400.0	194.4	406.4	2.40	2.00	1.33
7,992.0	85.00	178.60	7,515.8	-430.8	195.5	437.2	6.64	5.16	4.19
8,022.0	85.80	179.20	7,518.2	-460.7	196.1	467.1	3.33	2.67	2.00
8,053.0	86.40	179.20	7,520.3	-491.6	196.5	498.0	1.94	1.94	0.00
8,083.0	87.10	178.20	7,522.0	-521.6	197.2	528.0	4.06	2.33	-3.33
8,114.0	87.40	178.30	7,523.5	-552.5	198.2	558.9	1.02	0.97	0.32
8,144.0	87.50	180.00	7,524.8	-582.5	198.6	588.9	5.67	0.33	5.67
8,174.0	88.00	180.60	7,526.0	-612.5	198.4	618.8	2.60	1.67	2.00
8,205.0	88.40	180.70	7,527.0	-643.5	198.1	649.8	1.33	1.29	0.32
8,235.0	88.30	179.60	7,527.9	-673.4	198.0	679.8	3.68	-0.33	-3.67

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8,266.0	88.50	180.30	7,528.7	-704.4	198.0	710.7	2.35	0.65	2.26
8,297.0	88.00	179.40	7,529.7	-735.4	198.1	741.7	3.32	-1.61	-2.90
8,327.0	87.40	179.20	7,530.9	-765.4	198.5	771.7	2.11	-2.00	-0.67
8,357.0	87.50	180.90	7,532.2	-795.4	198.5	801.6	5.67	0.33	5.67
8,388.0	87.80	180.80	7,533.5	-826.3	198.0	832.6	1.02	0.97	-0.32
8,419.0	88.70	181.10	7,534.4	-857.3	197.5	863.5	3.06	2.90	0.97
8,449.0	88.80	181.30	7,535.1	-887.3	196.9	893.5	0.75	0.33	0.67
8,480.0	89.30	181.70	7,535.6	-918.3	196.1	924.4	2.07	1.61	1.29
8,510.0	89.80	183.10	7,535.8	-948.3	194.8	954.3	4.96	1.67	4.67
8,541.0	90.30	182.20	7,535.8	-979.2	193.4	985.2	3.32	1.61	-2.90
8,571.0	90.50	183.50	7,535.6	-1,009.2	191.9	1,015.1	4.38	0.67	4.33
8,602.0	90.40	183.60	7,535.4	-1,040.1	190.0	1,046.0	0.46	-0.32	0.32
8,632.0	90.40	183.60	7,535.1	-1,070.1	188.1	1,075.8	0.00	0.00	0.00
8,663.0	90.40	182.60	7,534.9	-1,101.0	186.4	1,106.7	3.23	0.00	-3.23
8,694.0	90.40	183.70	7,534.7	-1,132.0	184.7	1,137.6	3.55	0.00	3.55
8,725.0	90.40	183.60	7,534.5	-1,162.9	182.7	1,168.4	0.32	0.00	-0.32
8,755.0	90.20	183.80	7,534.3	-1,192.8	180.8	1,198.3	0.94	-0.67	0.67
8,785.0	90.00	183.50	7,534.3	-1,222.8	178.9	1,228.1	1.20	-0.67	-1.00
8,816.0	89.90	183.60	7,534.3	-1,253.7	176.9	1,259.0	0.46	-0.32	0.32
8,847.0	89.80	183.60	7,534.4	-1,284.7	175.0	1,289.8	0.32	-0.32	0.00
8,877.0	90.20	183.80	7,534.4	-1,314.6	173.1	1,319.7	1.49	1.33	0.67
8,908.0	91.20	183.20	7,534.0	-1,345.5	171.2	1,350.6	3.76	3.23	-1.94
8,938.0	92.60	183.70	7,533.0	-1,375.5	169.4	1,380.4	4.96	4.67	1.67
8,969.0	93.30	183.60	7,531.4	-1,406.4	167.4	1,411.2	2.28	2.26	-0.32
9,000.0	93.50	183.90	7,529.6	-1,437.2	165.4	1,442.0	1.16	0.65	0.97
9,030.0	93.20	182.80	7,527.8	-1,467.1	163.6	1,471.8	3.79	-1.00	-3.67
9,061.0	92.30	184.00	7,526.3	-1,498.0	161.8	1,502.7	4.84	-2.90	3.87
9,091.0	92.40	184.50	7,525.1	-1,527.9	159.6	1,532.5	1.70	0.33	1.67
9,122.0	92.10	184.70	7,523.9	-1,558.8	157.1	1,563.2	1.16	-0.97	0.65
9,152.0	92.00	184.50	7,522.8	-1,588.7	154.7	1,593.0	0.74	-0.33	-0.67
9,183.0	91.40	183.20	7,521.9	-1,619.6	152.6	1,623.9	4.62	-1.94	-4.19
9,213.0	91.40	184.20	7,521.2	-1,649.5	150.7	1,653.7	3.33	0.00	3.33
9,244.0	91.30	184.50	7,520.4	-1,680.4	148.3	1,684.5	1.02	-0.32	0.97
9,274.0	91.00	184.30	7,519.8	-1,710.4	146.0	1,714.3	1.20	-1.00	-0.67
9,305.0	90.90	184.10	7,519.3	-1,741.3	143.7	1,745.1	0.72	-0.32	-0.65
9,335.0	90.30	183.80	7,519.0	-1,771.2	141.7	1,775.0	2.24	-2.00	-1.00
9,366.0	90.50	183.20	7,518.8	-1,802.1	139.8	1,805.8	2.04	0.65	-1.94
9,396.0	90.80	182.80	7,518.5	-1,832.1	138.2	1,835.7	1.67	1.00	-1.33
9,428.0	91.00	183.00	7,518.0	-1,864.0	136.6	1,867.6	0.88	0.63	0.63
9,459.0	91.20	181.40	7,517.4	-1,895.0	135.4	1,898.5	5.20	0.65	-5.16
9,491.0	91.20	182.70	7,516.7	-1,927.0	134.3	1,930.4	4.06	0.00	4.06
9,523.0	91.40	181.50	7,516.0	-1,959.0	133.1	1,962.3	3.80	0.63	-3.75
9,554.0	91.40	181.60	7,515.2	-1,989.9	132.2	1,993.3	0.32	0.00	0.32
9,586.0	91.60	183.10	7,514.4	-2,021.9	130.9	2,025.2	4.73	0.63	4.69
9,617.0	91.80	181.80	7,513.4	-2,052.9	129.6	2,056.1	4.24	0.65	-4.19
9,650.0	91.80	183.10	7,512.4	-2,085.8	128.2	2,088.9	3.94	0.00	3.94
9,681.0	91.80	182.50	7,511.4	-2,116.8	126.7	2,119.8	1.93	0.00	-1.94
9,712.0	92.00	182.60	7,510.4	-2,147.7	125.3	2,150.7	0.72	0.65	0.32
9,744.0	91.90	181.90	7,509.3	-2,179.7	124.1	2,182.6	2.21	-0.31	-2.19
9,776.0	92.00	182.70	7,508.2	-2,211.6	122.8	2,214.5	2.52	0.31	2.50
9,808.0	92.10	183.00	7,507.1	-2,243.6	121.2	2,246.4	0.99	0.31	0.94
9,839.0	91.60	182.30	7,506.1	-2,274.5	119.7	2,277.3	2.77	-1.61	-2.26
9,871.0	90.70	182.30	7,505.4	-2,306.5	118.5	2,309.2	2.81	-2.81	0.00

Company:	PETROLEUM DEVELOPMENT CORP Weld County CO	Local Co-ordinate Reference:	Well Thornton 21R-403
Project:	SEC.21-T7N-R66W	TVD Reference:	WELL @ 4985.0ft (RKB - 15')
Site:	Thornton 21R-HZ Pad Sec.21-T7N-R66W	MD Reference:	WELL @ 4985.0ft (RKB - 15')
Well:	Thornton 21R-403	North Reference:	True
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	Landmark

Survey									
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)
9,903.0	90.90	182.20	7,505.0	-2,338.4	117.2	2,341.1	0.70	0.63	-0.31
9,935.0	90.50	181.90	7,504.6	-2,370.4	116.1	2,373.0	1.56	-1.25	-0.94
9,967.0	89.60	181.70	7,504.6	-2,402.4	115.1	2,404.9	2.88	-2.81	-0.63
9,998.0	87.90	180.00	7,505.3	-2,433.4	114.6	2,435.9	7.75	-5.48	-5.48
10,030.0	87.40	180.00	7,506.6	-2,465.4	114.6	2,467.8	1.56	-1.56	0.00
10,062.0	87.30	181.10	7,508.0	-2,497.3	114.3	2,499.8	3.45	-0.31	3.44
10,093.0	87.20	179.70	7,509.5	-2,528.3	114.1	2,530.7	4.52	-0.32	-4.52
10,125.0	87.70	180.40	7,511.0	-2,560.3	114.0	2,562.7	2.69	1.56	2.19
10,156.0	87.80	180.20	7,512.2	-2,591.2	113.9	2,593.6	0.72	0.32	-0.65
10,188.0	88.00	180.20	7,513.3	-2,623.2	113.8	2,625.6	0.63	0.63	0.00
10,220.0	88.00	178.70	7,514.5	-2,655.2	114.1	2,657.5	4.68	0.00	-4.69
10,251.0	87.00	178.20	7,515.8	-2,686.2	114.9	2,688.5	3.61	-3.23	-1.61
10,283.0	87.80	178.00	7,517.3	-2,718.1	116.0	2,720.5	2.58	2.50	-0.63
10,314.0	88.80	179.70	7,518.2	-2,749.1	116.6	2,751.5	6.36	3.23	5.48
10,345.0	90.20	180.00	7,518.5	-2,780.1	116.7	2,782.4	4.62	4.52	0.97
10,377.0	91.30	178.70	7,518.0	-2,812.1	117.0	2,814.4	5.32	3.44	-4.06
10,408.0	91.60	179.80	7,517.3	-2,843.1	117.4	2,845.4	3.68	0.97	3.55
10,440.0	91.30	178.30	7,516.4	-2,875.0	118.0	2,877.4	4.78	-0.94	-4.69
10,471.0	91.10	179.20	7,515.8	-2,906.0	118.7	2,908.4	2.97	-0.65	2.90
10,503.0	91.00	178.70	7,515.2	-2,938.0	119.2	2,940.4	1.59	-0.31	-1.56
10,534.0	91.00	178.60	7,514.7	-2,969.0	120.0	2,971.4	0.32	0.00	-0.32
10,566.0	91.00	177.60	7,514.1	-3,001.0	121.0	3,003.4	3.12	0.00	-3.13
10,598.0	91.00	177.90	7,513.6	-3,033.0	122.3	3,035.4	0.94	0.00	0.94
10,629.0	91.00	177.80	7,513.0	-3,063.9	123.5	3,066.3	0.32	0.00	-0.32
10,661.0	90.90	176.70	7,512.5	-3,095.9	125.0	3,098.3	3.45	-0.31	-3.44
10,693.0	91.30	177.20	7,511.9	-3,127.8	126.7	3,130.3	2.00	1.25	1.56
10,724.0	91.60	177.00	7,511.1	-3,158.8	128.3	3,161.3	1.16	0.97	-0.65
10,756.0	91.80	175.80	7,510.1	-3,190.7	130.3	3,193.3	3.80	0.63	-3.75
10,788.0	92.00	176.80	7,509.1	-3,222.6	132.3	3,225.3	3.19	0.63	3.13
10,819.0	92.30	175.70	7,507.9	-3,253.5	134.4	3,256.2	3.68	0.97	-3.55
10,851.0	92.50	175.20	7,506.6	-3,285.4	136.9	3,288.2	1.68	0.63	-1.56
10,883.0	92.30	176.60	7,505.2	-3,317.3	139.2	3,320.1	4.42	-0.63	4.38
10,915.0	92.00	177.00	7,504.0	-3,349.2	141.0	3,352.1	1.56	-0.94	1.25
10,946.0	91.70	177.10	7,503.0	-3,380.2	142.6	3,383.1	1.02	-0.97	0.32
10,978.0	90.50	176.70	7,502.4	-3,412.1	144.3	3,415.0	3.95	-3.75	-1.25
11,009.0	90.40	176.80	7,502.2	-3,443.1	146.0	3,446.0	0.46	-0.32	0.32
11,041.0	90.90	176.60	7,501.8	-3,475.0	147.9	3,478.0	1.68	1.56	-0.63
11,073.0	91.40	177.80	7,501.2	-3,507.0	149.5	3,510.0	4.06	1.56	3.75
11,104.0	91.60	177.40	7,500.4	-3,537.9	150.7	3,541.0	1.44	0.65	-1.29
11,136.0	91.40	176.20	7,499.5	-3,569.9	152.5	3,573.0	3.80	-0.63	-3.75
11,168.0	91.70	177.10	7,498.6	-3,601.8	154.4	3,605.0	2.96	0.94	2.81
11,199.0	91.30	177.40	7,497.8	-3,632.7	155.9	3,635.9	1.61	-1.29	0.97
11,231.0	90.90	176.60	7,497.2	-3,664.7	157.6	3,667.9	2.79	-1.25	-2.50
11,263.0	91.50	178.50	7,496.6	-3,696.7	158.9	3,699.9	6.23	1.88	5.94
11,294.0	93.50	180.10	7,495.2	-3,727.6	159.3	3,730.9	8.26	6.45	5.16
11,326.0	93.30	179.90	7,493.3	-3,759.6	159.3	3,762.8	0.88	-0.63	-0.63
11,357.0	90.50	177.80	7,492.3	-3,790.5	159.9	3,793.8	11.29	-9.03	-6.77
11,389.0	91.10	177.90	7,491.8	-3,822.5	161.1	3,825.8	1.90	1.88	0.31
11,421.0	89.80	179.20	7,491.6	-3,854.5	161.9	3,857.8	5.75	-4.06	4.06
11,453.0	89.90	178.60	7,491.7	-3,886.5	162.6	3,889.8	1.90	0.31	-1.88
11,485.0	90.30	178.90	7,491.6	-3,918.5	163.3	3,921.8	1.56	1.25	0.94
11,516.0	91.10	180.30	7,491.2	-3,949.5	163.5	3,952.8	5.20	2.58	4.52
11,548.0	92.60	180.40	7,490.2	-3,981.5	163.3	3,984.7	4.70	4.69	0.31

Company:	PETROLEUM DEVELOPMENT CORP Weld County CO	Local Co-ordinate Reference:	Well Thornton 21R-403
Project:	SEC.21-T7N-R66W	TVD Reference:	WELL @ 4985.0ft (RKB - 15')
Site:	Thornton 21R-HZ Pad Sec.21-T7N-R66W	MD Reference:	WELL @ 4985.0ft (RKB - 15')
Well:	Thornton 21R-403	North Reference:	True
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	Landmark

Survey									
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)
11,580.0	93.70	179.90	7,488.4	-4,013.4	163.2	4,016.6	3.77	3.44	-1.56
11,611.0	93.80	180.70	7,486.4	-4,044.3	163.0	4,047.5	2.60	0.32	2.58
11,643.0	93.70	181.60	7,484.3	-4,076.3	162.4	4,079.4	2.82	-0.31	2.81
11,674.0	94.10	182.40	7,482.2	-4,107.2	161.3	4,110.3	2.88	1.29	2.58
11,706.0	93.80	183.10	7,480.0	-4,139.1	159.8	4,142.1	2.38	-0.94	2.19
11,738.0	93.50	183.10	7,478.0	-4,171.0	158.1	4,173.9	0.94	-0.94	0.00
11,769.0	93.40	185.20	7,476.1	-4,201.8	155.8	4,204.7	6.77	-0.32	6.77
11,802.0	93.30	186.10	7,474.2	-4,234.6	152.6	4,237.3	2.74	-0.30	2.73
11,833.0	93.40	187.10	7,472.4	-4,265.3	149.0	4,267.9	3.24	0.32	3.23
11,865.0	92.90	187.70	7,470.6	-4,297.0	144.9	4,299.5	2.44	-1.56	1.88
11,897.0	92.90	188.10	7,469.0	-4,328.7	140.5	4,331.0	1.25	0.00	1.25
11,929.0	92.90	188.30	7,467.4	-4,360.3	135.9	4,362.4	0.62	0.00	0.63
11,941.0	92.80	188.70	7,466.8	-4,372.2	134.2	4,374.2	3.43	-0.83	3.33
11,994.0	92.80	188.70	7,464.2	-4,424.5	126.2	4,426.2	0.00	0.00	0.00
BHL 500'FSL, 1520'FEL									
11,997.0	92.80	188.70	7,464.0	-4,427.5	125.7	4,429.2	0.00	0.00	0.00

Checked By: _____	Approved By: _____	Date: _____
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